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AUTHOR Brooks, Kent
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ABSTRACT

One of 33 self-paced industry services leadership development (ISLD) modules, this module contains three sequential learning activities on developing training manuals for an industry services job training program. (The type of industry services for which these modules were developed would involve provision of job training by public agencies for new or expanding private industries.) The first learning activity is designed to provide the learner (industry services leader) with the needed background information on how to develop job analysis-based information and procedural manuals. The second learning activity gives opportunity to apply the information in a practice situation, and the final checkout activity allows the learner to develop a training manual in a real work situation, such as when employed or when serving as an intern learner. Feedback devices (learner self-test and performance checklist) are included for use by the learner and instructor/supervisor to assess progress. (This manual is the fifth in a group of seven on preparing training materials.) (JT)

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MODULE NUMBER VIII-E

DEVELOPING TRAINING MANUALS

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SELF-PACED INSTRUCTIONAL MODULE

Compiled by:
Kent Brooks

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College of Education
Mississippi State University
Mississippi State, Mississippi

Direct inquiries to the:

Research and Curriculum Unit
for
Vocational-Technical Education
College of Education
Drawer DX
Mississippi State, Mississippi 39762
Phone - (601) 325-2510

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INSTRUCTIONAL PROCEDURE

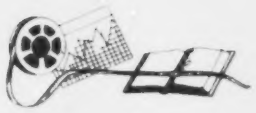
This module contains two sequential learning activities and a final check-out activity. A brief overview precedes each learning activity and the final check-out activity. Each learning activity and the final check-out activity provide learning experiences to help you accomplish the objectives. Feedback devices (learner self-test and performance checklist) are provided to help you determine when each objective has been accomplished. Sample elements of a training manual are provided as a guide in developing your own manual.

The first learning activity is designed to provide you with the needed **background information**. The second learning activity is designed to give you an opportunity to apply that information in a **practice** situation. The **Check-Out Activity** is the final learning activity. It is designed to allow you to develop a training manual in a real work situation, such as when you are employed or when you are serving as an intern learner. The **Performance Checklist** (Appendix A) is used by the learner and the instructor/supervisor to assess progress. The checklist is applicable for both practice performance and performance in the real work situation.

After reading the **Objectives** and the **Introduction** on pages 3 and 4, you should be able to determine how much of this module you will need to complete before the **Check-Out Activity**.

* If you already have the necessary **background information** required for developing a training manual, you may not need to complete **Learning Activity I**, p. 5 .
* If you already have had **practice** in developing a training manual, you may not need to complete **Learning Activity II**, p.21.
* Instead, with the approval of your instructor or supervisor, you may choose to proceed directly to the **Check-Out Activity**, and develop a training manual when you have access to a **real work situation**.

Your instructor or supervisor may be contacted if you have any difficulty with directions, or in assessing your progress at any time.



SUPPLEMENTARY TEACHING/LEARNING AIDS

An effort has been made to make this module as self-contained as possible. The information contained in the module should be sufficient to develop "entry-level" knowledge and skills. However, more has been written on this topic. The advanced learner may wish to attain higher levels of knowledge and skills.

A list of resources which supplement those contained within the module follows. Check with your instructor or supervisor (1) to determine the availability and the location of these resources, and (2) to get assistance in setting up additional learning activities.

This module may be used in conjunction with the following modules: module number VIII-A, **Conducting a Task Analysis**; module number VIII-B, **Developing Performance Objectives**; module number VIII-C, **Determining Types of Instructional Methods and Media**; and module number VIII-D, **Developing Performance Tests**.

Learning Activity I

* Bryan, Faye et al. **Duplicating Processes**. Mississippi State, Mississippi 39762: Research and Curriculum Unit, Drawer DX, 1975.
* Butler, F. Coit. **Instructional Systems Development for Vocational and Technical Training**. Englewood Cliffs, New Jersey 07632: Educational Technology Publications, 140 Sylvan Avenue, 1973.
* Johnson, Stuart R.; and Johnson, Rita B. **Developing Individualized Instruction**. Palo Alto, California 94304: Westinghouse Learning Press, 2680 Hanover Street, 1970.
* Mager, Robert F. **Measuring Instructional Intent**. Belmont, California 94002: Fearon Publishers, 6 Davis Drive, 1975.
* Mager, Robert F. **Preparing Instructional Objectives**. Belmont, California 94002: Fearon Publishers, 6 Davis Drive, 1975.
* Mager Associates, Inc. "You Can Hear the Learning Happen." Two filmstrips and Tape. Altos Hills, California 94022: Mager Associates, Inc., 13245 Rhoda Drive, 1974.

Learning Activity II

* (Same references as above)

Check-Out Activity

* Instructional materials specialists who have written training manuals
* Central duplicating personnel
* Industry representative -

OBJECTIVES

I. After completing the required reading, take the learner self-test to demonstrate that you have attained the knowledge of developing a training manual for an industry services program. You should complete all items correctly. **(Learning Activity I)**

II. After analyzing the performance instructions, complete all the designated experiences in developing a training manual in a practice situation. Your work must conform to the checklist provided. **(Learning Activity II)**

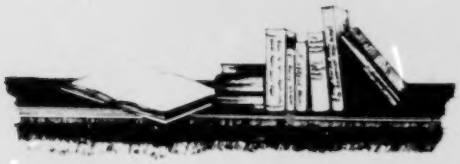
III. In an actual work situation, develop a training manual for an industry services program. Satisfactory performance will be realized when all items on the performance checklist (Appendix A) are rated "yes." **(Check-Out Activity)**

INTRODUCTION

Once the tasks to be covered in a training program have been identified and sequenced, the industry services leader must compile or develop manuals which provide the trainees with the performance objectives to be achieved, procedures to be followed in achieving the objectives, related knowledge to be learned, and performance tests to be completed. It is recognized that instructional materials/training aids may take many forms. However, the "bread and butter" item in industry services is the job analysis-based information and procedural manual. This type material has received wide acclaim in industry services programs because of the visibility provided for training requirements, and the multiple uses of the manual.

Because trainees have a wide range of abilities and motivation, it is desirable that the manuals provide access to detailed information in a format that is easily followed. The purpose of this module is to provide a framework for developing learner-centered training manuals. The information begins with synthesizing information collected from interviews and tapes, and ends with the coordination of the printing and distribution of the materials.

This module suggests a format for training manuals which brings into focus acceptable trends in materials development. It is very important that the industry services leader adopt a format which will promote consistency in training efforts, and streamline materials development and use.



LEARNING ACTIVITY I: INFORMATION

You should study the information presented in the following pages. After reading this material, you will demonstrate knowledge of developing a training manual by completing the **Learner Self-Test**, p. 15. You will be evaluating your knowledge by comparing your self-test answers with the **Answers to Self-Test**, p. 19.

I. TERMS UNIQUE TO MODULE

A. **Learner-centered manual**. Training information which is designed and written specifically for the learner, as opposed to a person other than the learner, e.g., instructor. Learner-centered manuals may also be used as a blueprint for developing lesson plans and other training guides.

B. **Authentication of information.** To establish the truth of information presented.

C. **Camera-ready copy**. The final draft copy prepared for printing.

D. **Composing copy**. To put together typewritten information and illustrations on a page.

E. **Copy**. The typewritten contents in a training manual.

F. **Format**. The organization and layout of written information and illustrative materials on the page.

G. **Master copy**. Used synonymously with camera-ready copy.

H. **Pasting and stripping**. Removing, replacing, and aligning copy and illustrations on the page.

I. **Synthesizing information**. Bringing together separate parts into a first draft form.

J. **Training manual**. A book of instructions on task information and procedures.

K. **Utilization guide**. A document which describes how to implement the manuals in state and local agencies, and industries. Also includes background data and information on project planning, development, and reviews.

L. **Vestibule training**. Learning activities provided within industry facilities, but in a specially prepared classroom or area separated from the production facilities.

M. **Vocational-technical curriculum and research unit**. A state center which develops and distributes training manuals and other curriculum material, and conducts evaluations and other research in vocational-technical education.

II. SYNTHESIZING INFORMATION FROM INTERVIEWS AND TAPES

A. **Sources of information.** The content of training manuals begins to be formulated during the first meetings with industry representatives. Portions of the information may be recorded on note paper, cassette tapes, or in industry-developed manufacturing guides. It is not a small task to synthesize this raw information into a form which can be recorded in training manuals. Accuracy of the information is paramount.

B. **Approaches to review and synthesis of information.** The synthesizing of industry information includes reviewing the information one or more times, recording what is considered to be pertinent, and having the recorded information authenticated by industry manufacturing personnel. One or more revisions will be required before the information is complete.

The availability of clearly formulated information from industry varies with each industry. Some industries possess detailed task information, and little effort may be required for synthesizing this information. Other industries, with the encouragement of the industry services leader, will assign one or more company employees the responsibility of conducting task analyses. The latter method for identifying training information is preferred, since it is generated by those who are most familiar with the industry procedures. However, it will be necessary for the industry services leader to assist in developing a standard format/procedure for recording this information. Even if every effort is made to obtain final copy from industry personnel, the industry services leader will be required to edit the copy, combine content when possible, and remove redundant information.

III. FORMAT

A. **Rationale for a standard format.** This module is directed toward developing a particular type training aid which is learner-centered. Quite often, a written manual is the only type training aid which can be justified in terms of cost, since a given industry services program affects a relatively small number of persons. However, this type manual has a wide range of uses in training, including a basis for instructor lesson plans, individualized/learner-paced instruction, and in-plant training.

The dictionary defines format as the general makeup, plan, organization, or arrangement of the publication. A standard manual format is suggested for use in industry services programs to insure uniformity of appearance and consistency in approaches to training. By following a standard manual format, writers will have fewer routine decisions to make and can concentrate on the instructional content of the manual. In the absence of a standard format, manuals tend to result in a hodgepodge of curricular activities.

For practical purposes, a standard format should accomplish the following four things:

1. Determine the sections to be contained in all training manuals.
2. Determine the sequential order in which the sections will appear in the training manuals.
3. Establish a common terminology applicable to the sections of the training manuals.
4. Serve as a check for the developer to insure that all necessary information has been included in the training manuals.

Training manuals should be designed to be as self-instructional as possible, so that the trainee will not need to ask the instructor for routine learning directions.

B. **Focus of training manual contents.** The contents of a training manual should center on one or more closely related tasks which, when completed, result in an industry product or subproduct.

C. **Elements of a training manual.**

1. Title and subtitles. Titles should be carefully selected, and should state the nature of the materials included in the manual. The title(s) should parallel the task(s) for which the manual is focused. Examples of titles follow:
   a. Manual title - Fabricating cylinders
   b. Subtitles
      1) Forming cylinders
      2) Welding cylinder seams

2. Instructional procedure. This section of the manual should indicate the nature and intent of the materials. Specific suggestions and alternate suggestions, if necessary, for using the manuals are stated. General procedures for the instructor and/or learner to follow when using the manuals are presented in this section. (Specific directions, when needed, are contained throughout the unit.) Evaluation techniques and procedures are also included.

3. Supplementary teaching/learning aids. Equipment, tools, supplies, or audio-visual media required to supplement the material presented in the manual should be identified in this section. Any special preparation required by the instructor and/or learner should also be stated. The exact location of the supplementary materials should be identified, along with instructions on which parts or pages should be examined.

4. Objectives. Objectives are statements in precise measurable terms of particular behaviors to be exhibited by a learner under specified conditions. Objectives state exactly what the learner is to know or be able to perform as a result of completing the manual, and the degree of proficiency expected.

5. Introduction. This is actually the beginning of the subject matter. The two important questions which should be answered in this section are:
   a. Why is the information or activity important?
   b. What benefit will the learner derive from learning the information, or from being able to perform the activity?

6. Learning activities. This section is the heart of the training manual. It contains the information and/or experiences the learner must read, study, participate in, or perform in reaching the stated objective(s).

   Because of the variety of materials developed for different industries, material presented in this section may take any of several styles. These styles might range from the question-and-answer approach; the old "T" format; a series of experiments or laboratory activities to be performed; information to be read and studied, or combinations of these.

Any supporting materials or data (tables, transparency masters, instruction sheets) needed for the training manual should be included in this section, provided the length does not distract from the learning activity. If it would be distractful to the continuity of the manual, notation of it would be made and the material should be presented in the appendix.

If the learning activity is concerned with skill development of a certain job, task, or operation, a procedure (performance guide) should be included in this section, or the section itself may be the procedure. Any self-tests that are part of the procedure, or would reinforce learning, should be included in this section. When it is possible to develop or acquire drawings, photographs, and other illustrative materials, they should be included with the technical information needed for task performance. The illustrations should be correctly labeled and referenced to the technical information presented in the manual.

7. Check-out activities. This is the evaluation section of the manual. It is used to determine the achievement level of the learner. In a skill development activity, the check-out activities would closely parallel, or duplicate the procedure for performing the job, task, or operation.

   In a training manual emphasizing cognitive objectives, the check-out activities (i.e., paper-and-pencil test) should relate to the stated objectives. Generally, check-out activities are not presented in the student material but rather are given at the completion of the learning activities. This procedure generally applies to any pretests as well. If pretests are used, notation of these would appear in the INSTRUCTIONAL PROCEDURE section of the manual.

   A performance checklist may be used as a standard upon which to judge learner performance on the check-out activity. It may include a list of criteria for judging task performance, rating scale, and instructions for rating task performance.

8. Additional related activities (optional). This section would give directions to the learner desiring to seek additional information, activities, or experiences related to the training manual topics or tasks. It should not be a continuation

of the same material included in the manual topics or tasks. Suggested additional activities could include related readings, plant-site visitations, or related experiments.

9. Appendices (optional). Any supplementary material to the training manual would be included in this section. Data or information used to support the learning activities may be included in the appendices when their length distracts from the continuity of the materials. (Transparency masters, worksheets, charts, instruction sheets, etc.)

10. Summary of format elements. The following elements should be considered for inclusion in training manuals.

    a. Title
    b. Instructional procedure
    c. Supplementary teaching/learning aids
    d. Objectives
    e. Introduction
    f. Learning activities
    g. Check-out activities
    h. Additional related activities
    i. Appendix

11. Variations may be necessary. The variety of instructional materials produced and the different methods of packaging them may necessitate slight variations to the standard format. This can be done, however, within the framework of the format itself.

    Obviously, a ten-page self-paced instructional manual is different from a 150-page resource manual; however, with slight variations the format can be used with both types of publications. Examination of these two vastly different types of publications should point out where variation to the format would be justified. The clue is usually found by asking the question, "Does the material have to stand by itself?"

    The ten-page manual designed to teach one idea or task must stand by itself.

Everything needed to instruct the learner, not only to understand the idea or to perform the task, but how to make proper use of the material, must be presented. The format, therefore, should be followed as presented in the previous pages.

The 150-page resource manual must also stand by itself; but this is not true of its various parts or chapters. Each part or chapter may be supported by information supplied elsewhere in the manual. For example, if the purpose of a particular resource manual is to provide the instructor with information necessary in preparing a training program, there would be no need to repeat the Instructional Procedure section at the beginning of each chapter. Instructional Procedures presented once at the beginning of the manual would suffice. Each chapter then may only include the Objectives, Introduction, Learning Activities, and Check-Out Activities. This variation could be repeated throughout the manual. Nevertheless, even with this slight variation, the format is still in effect.

IV. PREPARATION OF CAMERA-READY COPY

A. **Appearance of copy on page.** It is generally concluded that copy is easier to read when it is broken into small elements, as opposed to long paragraphs of written information.

B. **Coordinating the typing and composing of copy.** Firm instructions on format must be provided to the typist and others involved in composing the preliminary and final drafts. Composing the final copy includes typing the master copy of the training manual contents and pasting and stripping titles, illustrations, and corrected copy. Pasting and stripping activities cannot be taken lightly. When sections of the manual are corrected, removed, or replaced, the copy must also be properly realigned on the page.

C. **Editing copy.** Often, more than one person will be involved in compiling a training manual. Although a format may be agreed upon, one person must ultimately be responsible for molding the contents into camera-ready copy. Much technical editing will be necessary to obtain consistency in punctuation throughout the manual,

and to insure that every word in the manual is correctly spelled. A person with proven editorial experience should review each draft.

D. **Proofing copy**. Much effort is expended in developing/compiling training manuals. Yet, it is not unusual for a low priority to be placed on proofing the final copy. The final copy must be read and rere .ntil all copy mistakes are eliminated.

V. PRINTING AND BINDING MANUALS

A. **Determining how the manuals will be printed**. The most common duplication processes follow:

1. Photocopy process. This method may be used when only a few copies of the manual are needed, and when manuals are needed on short notice. Many schools have photocopy equipment.
2. Offset process. The offset method may be used when a large quantity of manuals are needed. Only larger school systems have offset printing equipment.
3. Stencil (mimeograph) process. This method is used when the developer does not have access to the above methods.

B. **Determining who will print manuals**. The following sources may have printing capabilities:

1. State division of vocational-technical education
2. State research and curriculum centers
3. University central duplicating departments
4. Local school central duplicating departments
5. Local printing companies

C. **Determining how manuals will be packaged**. The manner in which the pages in a manual are attached affects the extent to which the materials can be used in a training program. Some of the more common ways to bind manuals follow:

1. Perfect bind, using a glue process to attach pages and covers
2. Saddle-stitch, by folding pages, and stitching or stapling
3. Spiral binding, using prepared plastic coils
4. Three-ring notebook
5. Stapling

D. **Distributing manuals.** Training manuals are good publicity tools, as well as tools for training. A copy of the training manuals should be provided to appropriate individuals in the following organizations, provided the industry approves of the dissemination of the materials:

1. State division of vocational-technical education
2. State research and curriculum center
3. State agricultural and industrial board
4. State economic council
5. Governor's administrative departments
6. State senate and house of representatives
7. State and local employment service offices
8. Area industry development council
9. Local school administrative offices
10. Local school vocational-technical education department
11. Local chamber of commerce

* Continue this learning activity by taking the **Learner Self-Test** which follows.

LEARNER SELF-TEST

MULTIPLE CHOICE

This is a checkpoint knowledge test needed before proceeding to develop a training manual in a practice situation. The test statements below represent types of information appearing in training manuals. Read the statement carefully and identify the section of the manual format in which you believe this information should be placed. Make an "X" in the parenthesis in front of your selection. Check your answers with the **Answers to Self-Test** which follow. If you fail to complete all items correctly, you may wish to refer back to appropriate parts of the module information.

1. The information sheet appearing on page 7 of this unit must be duplicated in sufficient number for pass out to all learners.

   a. ( ) Supplementary Teaching/Learning Aids

   b. ( ) Pre-Lesson Activities

   c. ( ) How to Use This Material

   d. ( ) Instructions to Teachers

2. Press bearing to motor housing.
   Apply terminal wire.
   Assemble reciprocating spindle.

   a. ( ) Procedure

   b. ( ) Steps of Procedure

   c. ( ) Learning Activities

   d. ( ) Student Activities

3. Fifty-eight percent of business conducted at the distribution center is charged on credit cards. As a distribution center trainee, it is important for you to know how to properly fill out a credit card charge slip.

   a. ( ) Objective

   b. ( ) Presentation

   c. ( ) Subject Matter

   d. ( ) Introduction

4. Processing orders

   a. ( ) Suggested Activities

   b. ( ) Purpose of Lesson

   c. ( ) Title

   d. ( ) Objective

5. Your work will be judged by the instructor or supervisor using a performance checklist. All items on the performance checklist must be rated "yes."

   a. ( ) Instructional Procedure

   b. ( ) Check-Out Activities

   c. ( ) Evaluation Procedure

   d. ( ) Test Information

6. Acquire a book from your library on advertising.

   a. ( ) Instructions to Students

   b. ( ) Instructions to Teachers

   c. ( ) Instructional Procedure

   d. ( ) Supplementary Teaching/Learning Aids

7. The capacity of the company's products is presented in TABLE XII, page 107.

   a. ( ) Technical Data

   b. ( ) Appendix

   c. ( ) Supplementary Teaching Material

   d. ( ) Related Information

LISTING

Instructions: List in correct sequence the sections contained in a training manual.

1. _____ 7. _____
2. _____ 8. _____
3. _____ 9. _____
4. _____ 10. _____
5. _____ 11. _____
6. _____ 12. _____

ANSWERS TO SELF-TEST

MULTIPLE CHOICE

1. a.
2. c.
3. d.
4. c.
5. b.
6. d.
7. b.

LISTING

1. Title
2. Instructional Procedure
3. Supplementary Teaching/Learning Aids
4. Objectives
5. Introduction
6. Learning Activities
7. Check-Out Activities
8. Additional Related Activities
9. Appendix

* Proceed to the next learning activity for developing a training manual in a practice situation.

LEARNING ACTIVITY II: PRACTICE PERFORMANCE

You will be required to develop a training manual in a practice situation. You may wish to refer to the information found in the module. You must select at least two related tasks performed in a job. You must use the format suggested in this module to develop a manual which will instruct a learner in performing these tasks. You will be evaluating your performance in developing a training manual by using the **Performance Checklist** (Appendix A).

I. Study this module to determine the elements to be included in the training manual. Take close note of the sample elements presented in Appendix B.

II. Select at least two manipulative (psychomotor) tasks you have performed on a job during the last year. If possible, select tasks which are part of your present administrative or instructional responsibility. In other words, develop a manual for tasks which must be learned by your students or peer group.

III. Using references or personal knowledge, prepare information for each section contained in the manual. This will include developing a title, instructional procedure, supplementary teaching/learning aids, objectives, introduction, learning activities, and check-out activities.

IV. Prepare illustrative materials and include them at appropriate points in the manual.

V. Use the **Performance Checklist** from Appendix A to rate your competency in developing a training manual. All items on the checklist must be rated "yes."

* Continue to the **Check-Out Activity** for instructions on developing a training manual in a real work situation.

21

CHECK-OUT ACTIVITY: PERFORMANCE IN A REAL WORK SITUATION

The activity below is intended to be conducted in an actual on-the-job situation. It may be completed without completing the two learning activities, if you think you have the proficiency to do so.

In an actual work situation, you must develop a training manual for an industry in your community. You may wish to consult with an instructional materials specialist who has developed training manuals for industries. You must contact industry representatives for information to be included in the manual. A standard format should be used. You must coordinate the typing, proofing, and editing of the final copy. Your performance will be judged by your instructor or supervisor using a checklist. All items on the **Performance Checklist** (Appendix A) must be rated "yes."

* After completing the **Check-Out Activity**, you may select another module for study. Your instructor or supervisor may be contacted if you have any difficulty in selecting a module.

APPENDIX A

PERFORMANCE CHECKLIST

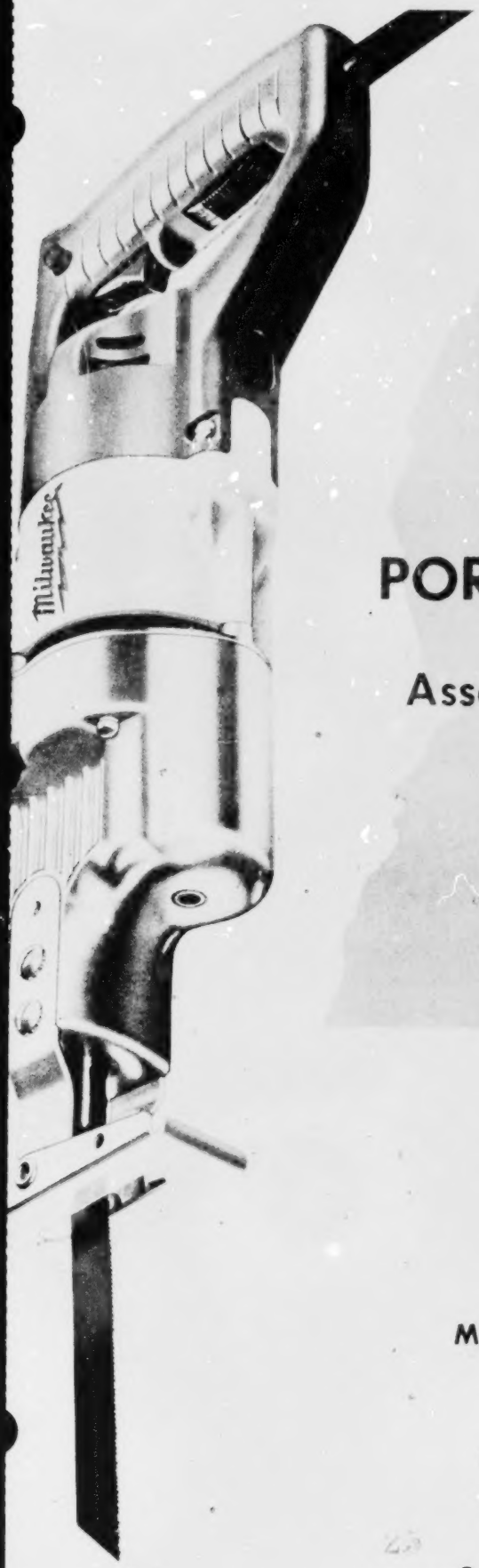
Developing training manuals.

INSTRUCTIONS: If the performance is satisfactory, write YES in the space provided. If the performance is unsatisfactory, write NO in the space. Each item must be rated "yes" for satisfactory task performance.

1. Learner directions in the manual are clearly written. ☐
2. The manual is free of technical subject errors. ☐
3. The manual is free of writing errors (punctuation and grammar). ☐
4. The format of the manual followed standard procedures. ☐
5. The information presented is easy to read and understand. ☐
6. The manual is free of trite, unrelated information. ☐

APPENDIX B

Sample Training Manual Elements



Milwaukee

D-HANDLE

PORTABLE ELECTRIC TOOLS

Training Manual for Assembling and Testing Armatures

Mississippi State Department of Education

Division of Vocational-Technical Education

Courtesy of Milwaukee Electric Tool Corporation

D-HANDLE

Portable Electric Power Tools

Training Manual for Assembling and Testing Armatures

Published by:

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Compiled by:

Kent Brooks
Instructional Materials Specialist
Trade and Industrial Education

Direct Inquiries to:

Research and Curriculum Unit
Drawer DX
Mississippi State, Mississippi 39762

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Jackson Plant

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Milwaukee, Wisconsin Plant

Dave Summerfield, Manufacturing Engineering
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Tom Bolton, Supervisor
Jackson Plant

Appreciation is also expressed to the following persons for their assistance in planning this guide:

Ben Eppes, Industrial Training Coordinator
Vocational-Technical Education Division
State Department of Education

Al Moore, Director
Hinds Junior College
Jackson Branch

Therman Alley, Industrial Training Coordinator
Hinds Junior College

Dr. James E. Wall, Director
Research and Curriculum Unit
Mississippi State University

INSTRUCTIONAL PROCEDURE

This manual contains one learning activity and a final check-out activity for the task covered. The learning activity should provide the learner with the knowledge required for successful performance of the task. The check-out activity is designed to allow the learner to perform the task in a real work situation.

A self-test is used by the learner to reinforce learning of task knowledge, and to determine readiness for the check-out activity (task performance).

SUPPLEMENTARY TEACHING/LEARNING AIDS

* Video Tape, Armature Assembly. Jackson, Mississippi 39205: Milwaukee Electric Tool Corporation, Milwaukee Street, 1975.

PERFORMANCE OBJECTIVE 1: Wind armature core

Using a Globe HFA-1 Automatic Armature Winder loaded with two bales of 24-gauge wire (23-94-1700) and armature blocks for above armature O.D., wind an armature core (16-09-000). No lead wires must be wound under a coil.

INTRODUCTION

A vital aspect of training is the accurate performance of tasks. The following will depict the information and procedures necessary for winding an armature core. The manufacturing engineering department has spent months analyzing the most efficient and safe way to perform the task. The operator should not deviate from these procedures without the expressed consent of the supervisor.

* Proceed to the learning activity.

LEARNING ACTIVITY

You should study carefully the technical information and performance guide presented in the following pages. After reading this material, you will demonstrate knowledge of winding an armature core by completing the **Learner Self-Test**. You will be evaluating your knowledge by comparing your self-test answers with the **Answers to Self-Test**.

I. TERMS UNIQUE TO TASK

A. Armature core. Laminated iron.

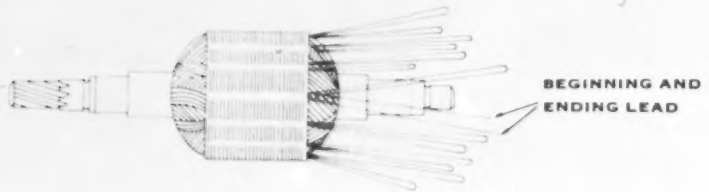
B. Armature stack. The parts which make up an armature core.

C. Coil. Wire wound around an armature core.

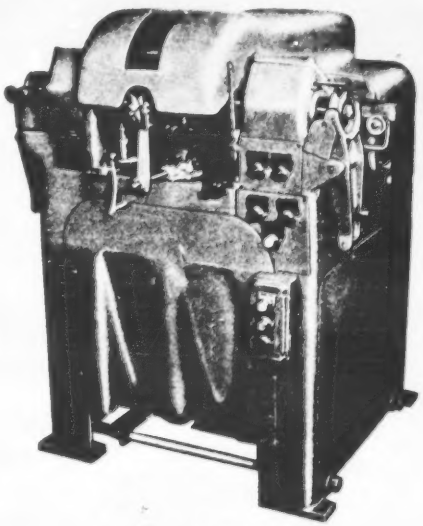
D. Laminations. Thin layers of iron.

II. MACHINE AND WORK CENTER ILLUSTRATIONS J206-0000

Wind 12 turns/coil of 23-94-1700 (24 Ga).
Globe wind, left hand flyer going, C. W. index.



Wound Armature



Armature Winder
(Courtesy The Globe Tool and Engineering Company)

III. INFORMATION OUTLINE

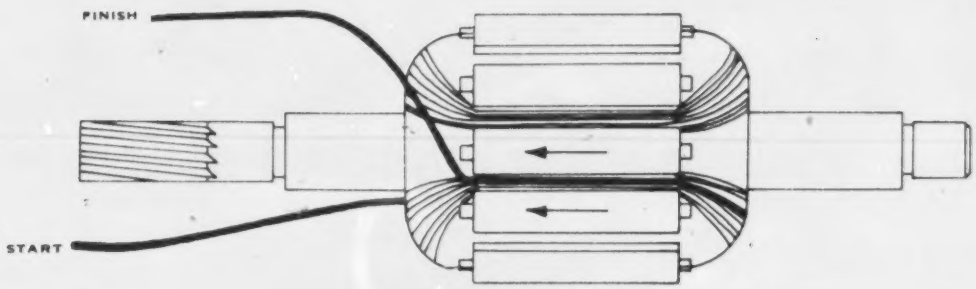
The purpose for winding an armature core is to provide coils which produce magnetic poles when current is supplied to the electric motor. There are two coils per armature slot. The numerous coils provide for smooth armature rotation in the electric motor.

Two automatic winding machines will be operated simultaneously at this work station. An inspector will occasionally sample and check the armatures for the proper number of turns per coil. This inspection procedure includes unwinding one coil on one armature slot and counting the number of turns. The operator of the automatic winding machine must also observe an automatic counter on the machine to see that the desired number of turns are being made on each armature slot.

The operator must observe the winding to insure that leads are not wound under coils. If this occurs, stop the machine and pull the lead back into position behind the lead trap. The lead traps are located on the back side of the winding jaws. No attempt must be made by the operator to adjust the machine. Call the set-up person if adjustments are needed.

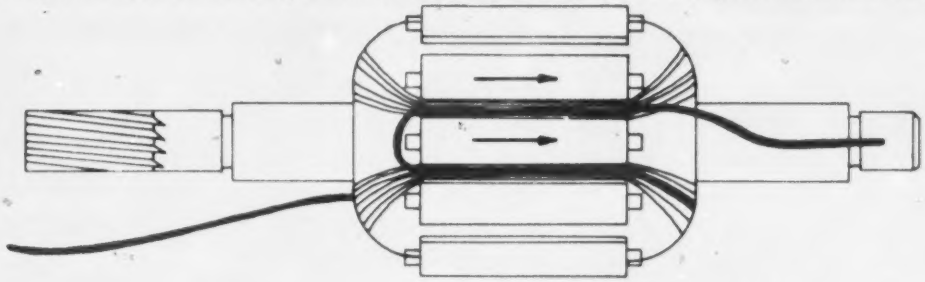
Each coil and slot on the armature is identified by a lead wire. The winding machine produces long and short leads alternately at each armature slot. The long and short leads are separated and connected to the armature commutator in later tasks. The beginning and ending leads are identified by twisting the wires together.

IV. PERFORMANCE GUIDE



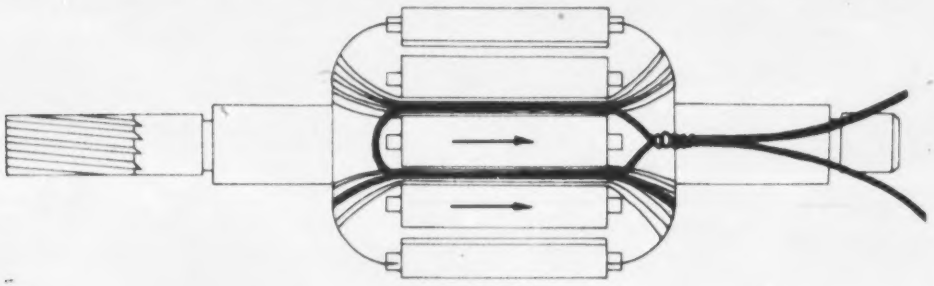
Step 1

Wire from last coil of winding machine is taken through slot to complete final turn of coil.



Step 2 (Left Index)

Same wire is looped over tooth and brought down through slot to right of last coil.



Step 3

* Continue this learning activity by taking the **Learner Self-Test** which follows.

LEARNER SELF-TEST

1. List two parts needed to wind an armature core.

   a.

   b.

2. No _____ wires must be wound under a coil.

3. The beginning and _____ leads are identified by twisting the wires together.

4. Which of the following procedures is incorrect?

   a. Insert armature into winding jaws.

   b. Start machine.

   c. Separate the beginning and ending leads.

   d. Place wound armature core aside.

ANSWERS TO SELF-TEST

1. Any two of the following:
   a. Wire
   b. Armature blocks
   c. Armature core
2. Lead
3. Tending
4. c

CHECK-OUT ACTIVITY

This activity is intended to be conducted in an actual on-the-job situation. You must wind an armature core. A Globe HFA-1 Automatic Armature Winder is set up and ready for operation. You must first orally repeat the procedure for cycling the machine to your supervisor. Then your supervisor will observe while you cycle the machine without a part. Next, your supervisor will observe while you wind an armature core. Your performance will be judged by your supervisor using the **Performance Checklist** which follows. All items on the checklist must be rated "yes" for satisfactory performance.

APPENDIX A

PERFORMANCE CHECKLIST

Wind armature core.

INSTRUCTIONS: If the performance is satisfactory, write YES in the space provided. If the performance is unsatisfactory, write NO in the space. Each item must be rated "yes" for satisfactory task performance.

1. No lead wires were wound under a coil. ☐
2. No attempt was made by the operator to adjust the machine. ☐
3. Operation was completed within the time specified by the supervisor. ☐
4. Standard procedures were followed in operating the machine. ☐
5. Leads were twisted together. ☐

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LIST OF INDUSTRY SERVICES LEADERSHIP DEVELOPMENT MODULES

I. **Orientation to Industry Services**

- A. Introduction to Industry Services
- B. Industry Services Leadership Development Program: Guide for Using the Self-Paced Instructional Modules

II. **Establishing Contacts and Relationships**

- A. Speaking to Industrial and Community Groups
- B. Writing Articles for News Media
- C. Identifying Functions of Agencies Involved in Industry Services
- D. Developing a Brochure for Industry Services

III. **Obtaining Agreements**

- A. Developing Training Agreements
- B. Developing a Lead-time Schedule
- C. Interpreting Legislation Related to Industry Services

IV. **Identifying Training Needs**

- A. Collecting Framework Production and Training Information
- B. Selecting Types of Training Programs
- C. Preparing a Budget for an Industry Services Project

V. **Acquiring Resources**

- A. Selecting Instructors for Industry Services
- B. Securing a Training Site
- C. Securing Training Equipment, Tools, and Supplies

VI. **Training Instructors for Industry Services**

Training Instructors for Industry Services

VII. **Preparing for Training**

- A. Adapting the Training Site to Training Needs
- B. Evaluating Safety Conditions at Training Sites
- C. Announcing the Opening of a Training Program

VIII. **Preparing Training Materials**

- A. Conducting a Task Analysis
- B. Developing Performance Objectives
- C. Determining Types of Instructional Methods and Media
- D. Developing Performance Tests
- E. Developing Training Manuals
- F. Preparing Videotapes for an Industry Services Program
- G. Setting Up Learning Centers for Industry Services Programs

IX. **Selecting Candidates**

Developing a Plan for Testing and Counseling Applicants for a Training Program

X. **Monitoring Training Programs**

- A. Assisting in Providing Pre-Employment and In-Plant Training
- B. Developing a Procedure for Keeping Participating Agencies Informed About Training Program Activities
- C. Monitoring Training Programs for Progress and Expenditures

XI. **Closing Training Programs**

Closing a Training Program

XII. **Placing Program Participants**

Developing a Plan for Placing Graduates of a Pre-Employment Training Program

XIII. **Evaluating Industry Services Programs**

Evaluating Industry Services Programs

Direct Inquiries To: Research and Curriculum Unit for Vocational-Technical Education, College of Education, Mississippi State University, Drawer DX, Mississippi State, MS 39762
(601) 325-2510